

Remarks

The Office Action dated March 4, 2011 again notes an objection to the title of the specification, and the following rejections are maintained: claims 23 and 25 stand rejected under 35 U.S.C. § 102(b) over Gardes (U.S. Patent No. 6,830,970); claims 24 and 26 stand rejected under 35 U.S.C. § 103(a) over the '970 reference in view of Hsuan (U.S. Patent Pub. 2001/0005046); claims 1, 3, 5-8, 10, 20-23, 25 and 27 stand rejected under 35 U.S.C. § 103(a) over Chudzik (U.S. Patent No. 7,030,481) in view of Gambino (U.S. Patent No. 6,025,226); and claim 1 stands rejected under 35 U.S.C. § 103(a) over the '481 and '970 references. Claims 2, 4 and 9 stand objected to, but are indicated as being allowable if rewritten in independent form. In this discussion set forth below, Applicant traverses all rejections and further does not acquiesce to any rejection or averment in the instant Office Action unless Applicant expressly indicates otherwise.

Applicant has amended claim 2 in accordance with the Examiner's suggestions and indications of allowability, and therefore understands that claim 2 and claim 4 that depends therefrom should be in condition for allowance. Applicant has also included new claim 30, which includes limitations similar to those indicated to be allowable in claim 9 as well as the claims from which claim 9 depends. Applicant would therefore understand that new claim 30 should also be in condition for allowance.

Applicant respectfully traverses the §§ 102(b) and 103(a) rejections of claims 23-26 because the cited '970 reference, alone or as combined, lacks correspondence. For example, the asserted reference does not appear to teach the claimed invention "as a whole" including aspects regarding, *e.g.*, a vertical interconnect having walls lined with conductive material, and a single deposition layer of dielectric material on first and second sides of a substrate, on the conductive material lining trenches, and on the walls of the vertical interconnect. The Office Action does not explain how such correspondence could be present as the rejection is not accompanied by any interpretation or further explanation in this regard. As such, the rejection fails.

Specifically regarding the alleged correspondence to aspects of the claimed invention directed to a conductive material lining a plurality of trenches, and a single deposition layer of dielectric material on the conductive material lining the trenches, the Office Action has misinterpreted the '970 reference. Referring to Figure 2D, the Office

Action has asserted that the conductive material 25 lines the trenches 21, and that dielectric material 24 is on the conductive lining material. However, as shown in Figure 2S, the conductive material 25 does not line the trenches 21. Rather, the oxide 24 lines the trench 21, and the metal 25 is formed on the oxide 24. Accordingly, there is no correspondence.

Furthermore, specifically regarding the element of the '970 reference asserted as corresponding aspects of the claimed invention directed to a vertical interconnect and a single deposition layer of dielectric material on sidewalls thereupon, the Examiner also appears to have misinterpreted the cited components in the '970 reference. For example, the Office Action as asserted that the metal 25 in Figure 2 is a "vertical interconnect" and that the oxide 24 is "on the walls of the vertical interconnect." However, the oxide 24 is clearly along only one wall of the metal 25, and a separate insulating material 26 is on the other wall of metal 25. Moreover, as metal 25 is formed after the oxide 24 as the oxide is grown via thermal oxidation (*i.e.*, it cannot be deposited), the '970 reference cannot correspond as asserted. With respect to the Advisory Action's attempt to assert left and right walls of the metal 25, it appears that the reference is made to separate metal portions as separated by insulating material 26, again with the oxide being only on one sidewall of each metal portion (see Figure 2E). This is consistent with column 3-28-49 of the '970 reference, which describes the conductive material 25 as being deposited on the oxide layer 24 (alleged as corresponding to a dielectric material as claimed). As the conductive material 25 is deposited on the oxide layer, the oxide layer cannot be deposited on sidewalls (plural) of the conductive material 25 in accordance with the claimed invention.

In view of the above, the Office Action has misinterpreted the '970 reference, which cannot correspond as asserted. Applicant therefore requests that the § 102(b) rejections of claims 23 and 25, as well as the § 103(a) rejections of claims 24 and 26 that depend from claim 23, be removed.

Applicant respectfully traverses the § 103(a) rejections over the '481 reference, alone or in combination with the '226 or '970 references because the asserted motivation in the Office Action would be inapplicable to the primary '481 reference. In particular, the Office Action relies upon an assertion that one would be motivated to modify the '481 reference because "a single deposition layer eliminates the need for an additional

step to pattern the dielectric layer.” However, this statement appears to contradict the cited portions of the ‘481 reference itself, which would appear to explicitly require such a patterning step in order to form conductive interconnects. For example, referring to cited Figure 3b, the ‘481 reference forms various connections including contact 3090 that would appear to necessarily interrupt any single layer formed as asserted, in both vertical trench capacitors and in a vertical interconnect. It would further appear that requiring the dielectric material in the ‘481 reference to be a single layer would actually introduce additional steps to the ‘481 reference, in requiring such etching. The Office Action has failed to provide any explanation as to how this asserted benefit/motivation would be or could be implemented with the cited references.

Accordingly, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching of ‘481 reference with the teaching of any reference to implement a single deposition layer of dielectric material as asserted. As such, the § 103(a) rejections over the ‘481 reference are improper and should be removed.

Applicant also traverses the § 103(a) rejections over the ‘481 reference, alone or in combination with the ‘226 or ‘970 references because the Office Action has failed to establish correspondence to various aspects of the claimed invention. For example, as consistent with the above, the Office Action has not established correspondence to aspects of the claimed invention directed to a device having both vertical trench capacitors and vias with a common dielectric layer therein. In particular, the Office Action has failed to provide an enabled embodiment in which the ‘481 reference would use such a layer, with motivation for doing so.

With specific regard to the newly-cited ‘769 reference as introduced in the final Office Action as disclosing aspects of the claimed invention directed to vias or interconnects, it appears that the Examiner has acknowledged the lack of correspondence in the ‘481 reference and is attempting to modify the ‘481 reference with the newly cited ‘769 reference, using motivation in the ‘226 reference. The Examiner has again failed to explain how the ‘481 reference could be implemented with a single dielectric layer as claimed, and related lack of motivation as asserted. Regarding the Examiner’s assertion in the Advisory Action that the ‘769 reference is not used to modify the ‘481 reference

but instead support the disclosure therein, Applicant notes that this assertion ignores the fact that no citation to corresponding description has been provided for the '769 reference. Accordingly, if the '769 reference is not being relied upon to provide correspondence and/or modify the '481 reference, it would appear that the rejection necessarily fails for lack of correspondence. Moreover, no motivation has been provided for combining the '769 reference as asserted. As such, the rejections fail for lack of correspondence and/or motivation, and further for failing to properly note the '769 reference in the statement of rejection, for reliance upon teachings therein.

Applicant further traverses the § 103(a) rejection of claim 1 over the '481 and '970 references for reasons including those discussed above in connection with the rejections of claims 23-26, as the secondary '970 reference fails to correspond as asserted. For example, the '970 reference does not disclose a vertical interconnect having walls lined with conductive material. Moreover, as the asserted oxide 24 does not form between first and second conductive trenches of vertical trench capacitors, the resulting combination would appear to require a single-conductor in the resulting trench, thus failing to correspond to vertical trench capacitors as asserted. Further, the Office Action does not explain how such correspondence could be present as the rejection is not accompanied by any interpretation or further explanation in this regard. As such, the rejection fails.

Applicant has added new claims 28 and 29, and believes these new claims to be allowable over the references as asserted in view of the above discussion regarding the impropriety of claim 23 from which new claims 28-29 depend. Applicant further submits that these new claims are allowable over the cited references as asserted, as the Office Action has not to asserted correspondence to a single deposition layer of dielectric material on vertical interconnect walls that oppose one another, with the vertical interconnect extending uninterrupted between the walls, or to a vertical capacitor including a conductive material lining a sidewall, a single deposition layer of dielectric material on the conductive material, and a second conductive material on the single deposition layer. Applicant has also added new claim 31 and amended claim 7, and believes that these claims are allowable as discussed above and further because the references as asserted fail to disclose aspects of the claimed invention directed to a single dielectric layer on a surface or both surfaces of a substrate, or arranged to insulate a

circuit from the substrate. Support for these claims may be found throughout the specification, with exemplary embodiments shown in Figure 2 and described in connection therewith at paragraphs 0050-0054 of Applicant's published specification.

Regarding the objection to the title of the specification, Applicant appreciates Examiner's suggestion, and would respectfully suggest the similar title without claim terminology: Electronic device, assembly and methods of manufacturing an electronic device including a vertical trench capacitor and a vertical interconnect.

In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Juergen Krause-Polstorff, of NXP Corporation at (408) 474-9062.

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